

U.S. Patent Application No. 09/996,516
Amendment dated May 9, 2005
Reply to Office Action dated November 17, 2004

AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

Claim 1 (withdrawn): An enzyme-treated papermaking sludge consisting essentially of a papermaking sludge combined with an enzyme composition.

Claim 2 (withdrawn): The enzyme-treated papermaking sludge of claim 1, wherein said enzyme composition has cellulytic activity.

Claim 3 (withdrawn): The enzyme-treated papermaking sludge of claim 1, wherein said enzyme composition has both cellulytic and hemicellulytic activity.

Claim 4 (withdrawn): The enzyme-treated papermaking sludge of claim 1, wherein said enzyme composition has lipase activity.

Claim 5 (withdrawn): The enzyme-treated papermaking sludge of claim 1, wherein said enzyme composition is added to said papermaking sludge in an amount of from about 1.00% by weight to about 0.001% by weight active enzyme based on the dried solids weight of both the active enzyme and the sludge.

Claim 6 (withdrawn): The enzyme-treated papermaking sludge of claim 5, wherein said enzyme composition comprises from about 5% by weight to about 20% by weight active enzyme based on the dried solids weight of both the active enzyme and the enzyme composition.

Claim 7 (withdrawn): An enzyme-treated papermaking sludge composition comprising

U.S. Patent Application No. 09/996,516
Amendment dated May 9, 2005
Reply to Office Action dated November 17, 2004

from about 50% to about 100% by weight papermaking sludge, and from about 1% by weight to about 50% by weight enzyme composition, based on the dried solids weight of the papermaking sludge and the enzyme composition.

Claim 8 (withdrawn): The enzyme-treated papermaking sludge of claim 7, wherein said enzyme composition comprises from about 5% by weight to about 20% by weight active enzyme based on the dried solids weight of both the active enzyme and the enzyme composition.

Claim 9 (withdrawn): A method of making paper or paperboard comprising:

- a) combining at least one enzyme composition and at least one papermaking sludge to form an enzyme-treated sludge;
- b) combining the enzyme-treated sludge with a papermaking pulp to form a treated pulp; and
- c) forming the treated pulp into a paper or paperboard product.

Claim 10 (withdrawn): The method of claim 9, further comprising introducing at least one sizing material to the papermaking pulp.

Claim 11 (withdrawn): The method of claim 10, wherein said sizing material comprises an ASA sizing emulsion.

Claim 12 (withdrawn): The method of claim 9, wherein said enzyme composition contains from about 5 % to about 20 % by weight active enzyme based on the dried solids weight of both the active enzyme and the enzyme composition.

Claim 13 (withdrawn): The method of claim 9, wherein said enzyme composition is

U.S. Patent Application No. 09/996,516
Amendment dated May 9, 2005
Reply to Office Action dated November 17, 2004

added to said papermaking sludge in an amount of from about 1.00% by weight to about 0.001% by weight active enzyme based on the dried solids weight of both the active enzyme and the sludge.

Claim 14 (currently amended): ~~The method of claim 18~~ A method of improving sizing in a paper or paperboard product, comprising:

combining a papermaking sludge with an enzyme composition to form an enzyme-treated sludge;

combining said enzyme-treated sludge with a papermaking pulp to form a treated pulp;
and

forming a paper or paperboard product from said treated pulp, wherein said product has improved sizing compared to the sizing of an identical paper or paperboard product but not having the sludge treated with enzyme composition,

wherein said enzyme composition comprises at least one polyamide oligomer and at least one cellulytic enzyme.

Claim 15 (withdrawn): The method of claim 9, wherein said enzyme composition comprises a lipase enzyme.

Claim 16 (previously presented): The method of claim 18, wherein said enzyme-treated sludge is added in an amount of from about 1 pound per ton of papermaking pulp to about 50 pounds per ton of papermaking pulp based on the dried solids weight of both the enzyme-treated sludge and the papermaking pulp.

U.S. Patent Application No. 09/996,516
Amendment dated May 9, 2005
Reply to Office Action dated November 17, 2004

Claim 17 (withdrawn): A paper or paperboard product made from the method of claim 9.

Claim 18 (currently amended): A method of improving sizing in a paper or paperboard product, comprising:

combining a papermaking sludge with an enzyme composition to form an enzyme-treated sludge, wherein said enzyme composition comprises at least one of a protease, an esterase or a lipase;

combining said enzyme-treated sludge with a papermaking pulp to form a treated pulp;
and

forming a paper or paperboard product from said treated pulp, wherein said product has improved sizing compared to the sizing of an identical paper or paperboard product but not having the sludge treated with enzyme composition.

Claim 19 (original): The method of claim 18, wherein said papermaking pulp comprises a sizing material.

Claim 20 (original): The method of claim 18, wherein said papermaking pulp comprises an ASA sizing emulsion.

Claim 21 (original): The method of claim 18, wherein said improved sizing comprises an improved retention of sizing material.

Claim 22 (original): The method of claim 18, wherein said improved sizing comprises an improved resistance to size reversion.

Claim 23 (original): The method of claim 18, wherein said enzyme composition has

U.S. Patent Application No. 09/996,516
Amendment dated May 9, 2005
Reply to Office Action dated November 17, 2004

cellulytic activity.

Claim 24 (original): The method of claim 18, wherein said enzyme composition has both cellulytic and hemicellulytic activity.

Claim 25 (original): The method of claim 18, wherein said enzyme composition has lipase activity.

Claim 26 (original): The method of claim 18, wherein said enzyme composition is added to said papermaking sludge in an amount of from about 1.00% by weight to about 0.001% by weight active enzyme based on the dried solids weight of both the active enzyme and the sludge.

Claim 27 (original): The method of claim 26, wherein said enzyme composition comprises from about 5% by weight to about 20% by weight active enzyme based on the dried solids weight of both the active enzyme and the enzyme composition.

Claim 28 (withdrawn): A paper or paperboard product made from a treated papermaking pulp, said treated papermaking pulp comprising a papermaking pulp and an enzyme-treated papermaking sludge.

Claim 29 (withdrawn): The paper or paperboard product of claim 28, wherein said enzyme-treated papermaking sludge is present in said paper or paperboard product in an amount of from about 5 pounds per ton of papermaking pulp to about 200 pounds per ton of papermaking pulp based on the dried solids weight of both the enzyme-treated sludge and the papermaking pulp.